Unit A1.2, Linear Equations and Inequalities: Notes Name ______________________________

Lesson 1: Solving Equations With Balanced Moves

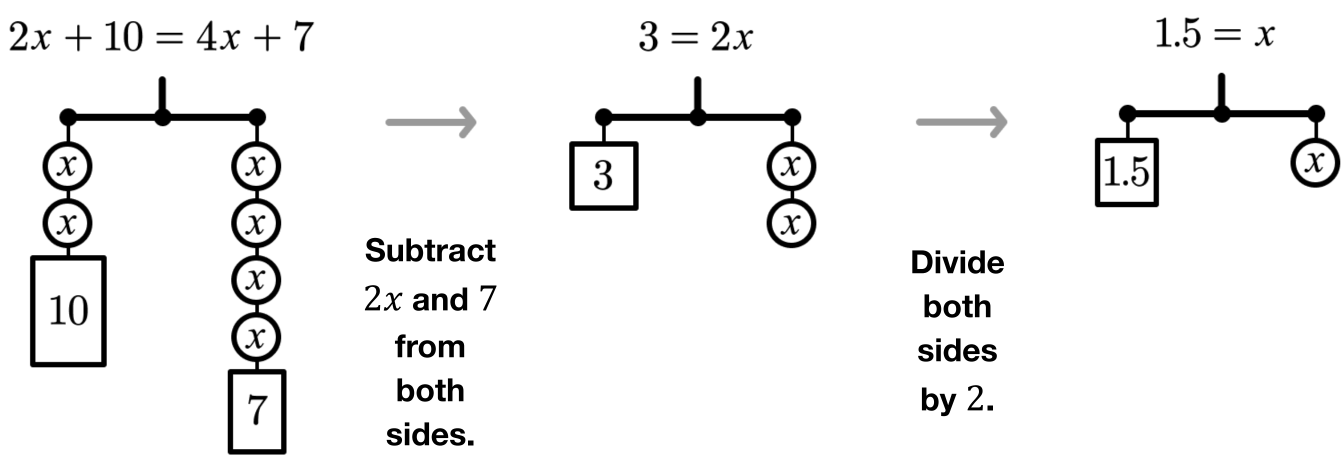
Summary

Solving an equation means determining all the values that make an equation true.

Hanger diagrams can be useful to represent and help solve equations.

Here is Ayaan's work to solve the equation $2x + 10 = 4x + 7$.

Write what Ayaan did under each arrow.



$x = 1.5$ is the *solution* to $2x + 10 = 4x + 7$. Explain what *solution* means in your own words.

***Explanations vary.* If $x = 1.5$ is a solution, then when 1.5 is substituted for x in the equation, the left and right sides are equal.**

Things I Want to Remember

desmos

Unit A1.2, Linear Equations and Inequalities: Notes Name ____________________

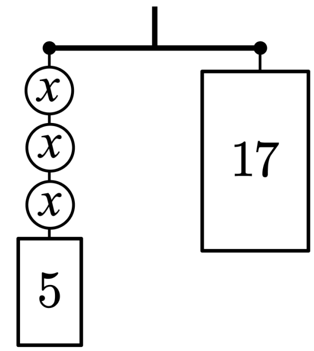
Lesson 1: Solving Equations With Balanced Moves

Try This!

1. Solve the equation $3x + 5 = 17$.

   Use the balanced hanger if it helps with your thinking.

   $x = 4$

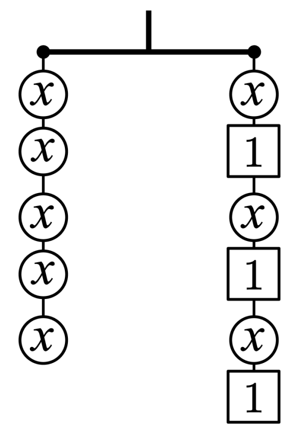


2. Write an equation that this balanced hanger represents. ***Equations vary.***

   $5x = 3(x + 1)$

   Solve the equation that you wrote.

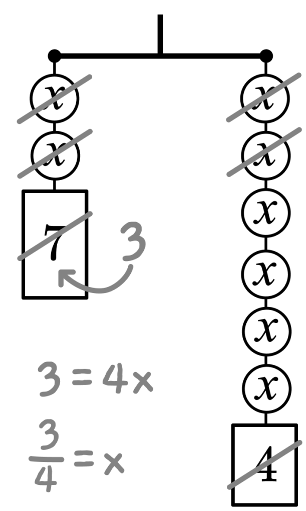
   $x = \frac{3}{2}$



3. Solve the equation $2x + 7 = 6x + 4$.

   Draw a hanger if it helps with your thinking. ***Hangers vary.***

   $x = \frac{3}{4}$



- ☐ I can determine a solution to an equation by modeling it with a hanger diagram.
- ☐ I can describe balanced moves and use them to solve an equation.

Lesson 2: Solving Equations With Inverse Operations

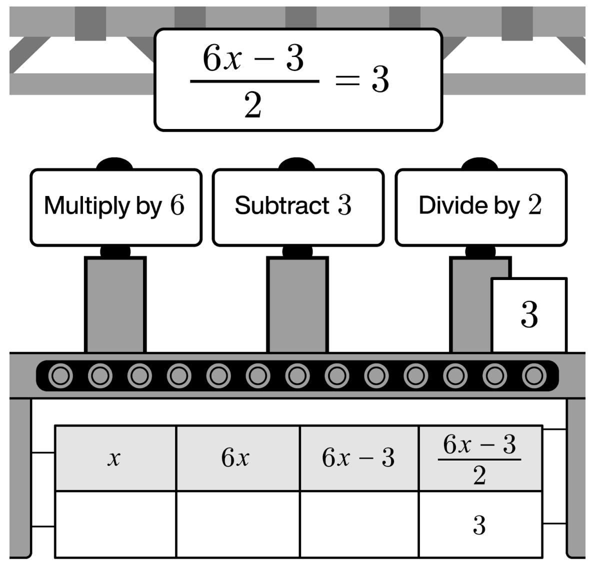
Summary

Working backwards can help solve equations.

A table and a number machine are two strategies for solving the equation $\frac{6x-3}{2} = 3$.

Show or explain how the table or number machine are each connected to the equation.

Explanations vary. **The machine and table show the order of the operations that happen to the input x to create $\frac{6x-3}{2}$. The machine and the table also show that the output is equal to 3.**



Solve the equation $\frac{6x-3}{2} = 3$.

Use the table or machine if it helps with your thinking.

$$x = \frac{3}{2}$$

Show that your solution is correct.

I substituted $x = \frac{3}{2}$ into the original equation and got a true equation.

$$\frac{6\left(\frac{3}{2}\right)-3}{2} = 3$$

$$3 = 3 \checkmark$$

Things I Want to Remember

Lesson 2: Solving Equations With Inverse Operations

Try This!

1. Solve $-30 = -5(x + 2)$.

$x = 4$

Use the table if it helps with your thinking.

x	$x + 2$	$-5(x + 2)$
		-30

Show that your solution is correct.
Responses vary.

$-30 = -5((4) + 2)$

$-30 = -5(6)$

$-30 = -30$ ✓

2. Solve $\dfrac{3x + 9}{2} = 12$.

$x = 5$

Use the table if it helps with your thinking.

x			$\dfrac{3x+9}{2}$
			12

Show that your solution is correct.
Responses vary.

$\dfrac{3(5) + 9}{2} = 12$

$\dfrac{15 + 9}{2} = 12$

$\dfrac{24}{2} = 12$

$12 = 12$ ✓

☐ I can describe and use inverse operations to solve an equation

Lessons 3–4: Solving One-Variable Equations

Summary

Each step in solving an equation creates a new equation that is *equivalent* to the original.

We know they are equivalent because they have the same solutions.

Here is Juan's work to solve the equation $2 - 4x = -2(3x - 4)$.

Explain what Juan did at each step. ***Explanations vary.***

- **Juan first divided both sides by -2.**
- **Next, Juan added 4 to both sides of the equation because $-4 + 4 = 0$.**
- **Lastly, Juan subtrated $2x$ from both sides of the equation because $2x - 2x = 0$.**

Juan's Work

Step 1:	$2 - 4x = -2(3x - 4)$
Step 2:	$-1 + 2x = 3x - 4$
Step 3:	$3 + 2x = 3x$
Step 4:	$3 = x$

What errors might someone make when solving an equations like $2 - 4x = -2(3x - 4)$?

Responses vary. **They could start by adding 2 to both sides of the equation, but the -2 is being multiplied to $3x - 4$, not added. They could distribute the -2 to only the first term and get $-6x - 4$ instead of $-6x + 8$.**

Show that $x = 3$ is the solution to **every** step of Juan's work.

$2 - 4x = -2(3x - 4)$	$-1 + 2x = 3x - 4$	$3 + 2x = 3x$	$3 = x$
$2 - 4(3) = -2(3(3) - 4)$	$-1 + 2(3) = 3(3) - 4$	$3 + 2(3) = 3(3)$	$3 = 3$ ✓
$-10 = -10$ ✓	$5 = 5$ ✓	$9 = 9$ ✓	

Things I Want to Remember

Lessons 3–4: Solving Equations in One Variable

Try This!

1.1 Solve $2(y + 1) = \frac{y - 4}{3}$ to show that the solution is $y = -2$.

Strategies vary. $6(y + 1) = y - 4$

$6y + 6 = y - 4$

$5y + 6 = -4$

$5y = -10$

$y = -2$

1.2 Show that $y = -2$ is the solution to $2(y + 1) = \frac{y - 4}{3}$.

Strategies vary. $2((-2) + 1) = \frac{(-2) - 4}{3}$

$2(-1) = \frac{-6}{3}$

$-2 = -2$ ✓

Juan made an error solving $-3(x - 2) = 1 - 2x$.

2.1 Describe one thing Juan did well. ***Responses vary.***

He subtracted 1 from each side because $1 - 1 = 0$.

2.2 Circle the step with the error. **Step 2 has the error.**

2.3 Solve $-3(x - 2) = 1 - 2x$.

$x = 5$

Juan's Work

Step 1: $-3(x - 2) = 1 - 2x$

Step 2: $-3x - 6 = 1 - 2x$

Step 3: $-3x - 7 = -2x$

Step 4: $-7 = x$

- ☐ I can explain whether two equations are equivalent.
- ☐ I can justify that a step in solving a linear equation creates an equation with the same solution.
- ☐ I can analyze others' reasoning when solving equations.
- ☐ I can solve one-variable linear equations.

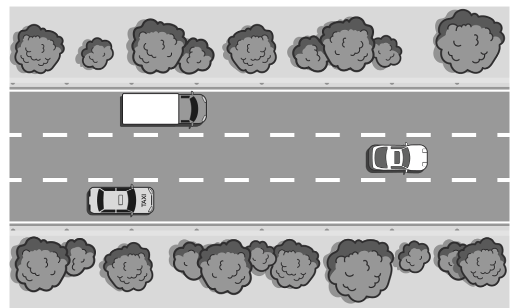
Lesson 5: No Solution and Infinite Solutions

Summary

Linear equations can have *no solutions*, *one solution*, or *infinitely many solutions*.

- In an equation with *no solutions*, no value of x makes the equation true.
- In an equation with *infinitely many solutions*, every value of x makes the equation true.

The equation $t = t + 2$ has **no** solution(s).



If this equation represents the time, t, that two vehicles would be in the same position, then:

A. They will never be in the same position.

B. They will be in the same position after 2 seconds.

C. They will always be in the same position.

The equation $2t = 8t$ has **one** solution(s).

If this equation represents the time, t, that two vehicles would be in the same position, then . . .

. . . they will be in the same position after 0 seconds.

The equation $2t + 6 = 2(t + 3)$ has **infinite** solution(s).

If this equation represents the time, t, that two vehicles would be in the same position, then . . .

. . . they will always be in the same position.

Things I Want to Remember

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Unit A1.2, Linear Equations and Inequalities: Notes Name ______________________

Lesson 5: No Solution and Infinitely Many Solutions

Try This!

Solve each equation and determine how many solutions it has.

1. $10x + 4 = 2(5x + 4)$

Strategies vary.

$5x + 2 = 5x + 4$

$2 = 4$

Circle one:	No solution	One solution	Infinite solutions

2. $10x = 5x - 12$

Strategies vary.

$5x = 12$

$x = \frac{12}{5}$

Circle One:	No solution	One solution	Infinite solutions

3. $10x = 5x$

Strategies vary.

$5x = 0$

$x = 0$

Circle one:	No solution	One solution	Infinite solutions

4. $\frac{10x + 8}{2} = 5x + 4$

Strategies vary.

$10x + 8 = 10x + 8$

$8 = 8$

Circle one:	No solution	One solution	Infinite solutions

☐ I can describe the effect of dividing by a variable when solving an equation.
☐ I can justify whether a one-variable equation has one solution, no solution, or infinite solutions.

Lesson 6: Representing Situations With Two-Variable Equations

Summary

Sometimes equations have more than one variable in them. Different forms of the equation can be helpful in different situations.

Here are two equivalent equations about a subway car's capacity (i.e., the number of people who fit inside).

$6t + 2d = 600$ $\qquad$ $d = 300 - 3t$

- t is the number of seats (seating capacity).
- d is the standing capacity.

Show the steps to solve $6t + 2d = 600$ for d.

$$6t + 2d = 600$$
$$-6t \qquad -6t$$

$$\frac{2d}{2} = \frac{600 - 6t}{2}$$

$$d = 300 - 3t$$

When would it be useful to use the equation solved for d? ***Responses vary.***

- **It would be useful if you know how many seats are in a subway car and you want to know how many people standing can fit.**
- **It would be useful if you wanted to know how the standing capacity changes based on the number of seats.**

Things I Want to Remember

Lesson 6: Representing Situations With Two-Variable Equations

Try This!

Tiara is saving $\$240$ for a new gaming console. To earn the money she needs, she works at the pool for $\$8$ an hour and earns $\$12$ an hour tutoring Spanish.

Tiara wrote the equation $8p + 12t = 240$ to represent her situation.

1. Explain what each part of $8p + 12t = 240$ represents in Tiara's situation. ***Responses vary.***
   - **The 8 represents how much Tiara makes per hour at the pool, and p represents the number of hours she spends working at the pool.**
   - **The 12 represents how much Tiara makes per hour tutoring and t represents the number of hours she spends tutoring.**
   - **The 240 represents the total amount of money Tiara wants to save.**

2. Complete the table for the missing values of t.

p	t
3	18
15	10
18	8

3. Which equation solved for t is equivalent to $8p + 12t = 240$?

   A. $t = 240 - 8p$

   B. $t = 20 - \frac{2}{3}p$

   C. $t = 30 - \frac{3}{2}p$

   D. $t = -\frac{2}{3}p + 30$

   Show or explain how you know. ***Explanations vary.* See the work on the right.**

$$8p + 12t = 240$$
$$12t = 240 - 8p$$
$$t = 20 - \frac{2}{3}p$$

4. When might the equation that you chose in problem 3 be helpful to Tiara? ***Responses vary.***

   It could be helpful if Tiara already knows how many hours she will be working at the pool and needs to know how many hours she has to tutor to reach her goal.

- ☐ I can represent constraints using two-variable equations and interpret their solutions.
- ☐ I understand that different forms of a linear equation can be useful for different purposes.

Lesson 7: Solving for a Variable

Summary

To solve for a variable means to write an equivalent equation that isolates the variable.

What does this mean in your own words? ***Responses vary.***

> **To solve for a variable means to solve until the variable you want is the only thing on one side of the equal side.**

Here are two equations. Solve each equation for t.

$10 = 4 - 3t$	$10 = v - at$
$6 = -3t$	$10 - v = -at$
$-2 = t$	$\frac{10 - v}{-a} = t$ **(or equivalent)**

How would you explain solving an equation with multiple variables to a student who was absent?

Responses vary. **Solving an equation with multiple variables is just like solving equations with one variable except that the variables aren't always like terms. For example, you might subtract v from both sides of the equation to make $v - v = 0$, but the v isn't a like term with anything so you just leave the expression instead of combining.**

Things I Want to Remember

Lesson 7: Solving for a Variable

Try This!

Solve each equation for m.

1.1 $\frac{m}{3} + 7 = -4$

$\frac{m}{3} = -11$

$m = -33$

1.2 $\frac{m}{a} + t = h$

$\frac{m}{a} = h - t$

$m = a(h - t)$ **(or equivalent)**

Here is an equation: $4x - 8y = 16$.

2.1 Two of the equations below are equivalent to $4x - 8y = 16$.

Circle the equation that is **not** equivalent to $4x - 8y = 16$.

A. $2x - 4y = 8$ **B.** $8y = 16 + 4x$ C. $x = 4 + 2y$

2.2 Solve the equation $4x - 8y = 16$ for y.

$4x - 8y = 16$

$-8y = 16 - 4x$

$y = -2 + 0.5x$ **(or equivalent)**

☐ I understand what “to solve for a variable” means.
☐ I can solve an equation with multiple variables for one of the variables.

Lessons 8–9: Linear Relationships in Equations, Tables, and Graphs

Summary

Equations, tables, and graphs are different ways to model a situation.

Situation: A lemonade stand sells lemonade for $\$3$ per cup and cookies for $\$2$ each. They made $\$12$. Let l be the number of cups of lemonade sold and c be the number of cookies sold.

Show the steps to solve $3l + 2c = 12$ for c.

$$3l + 2c = 12$$

$$2c = 12 - 3l$$

$$c = 6 - \frac{3}{2}l$$

Equation in Standard Form

$$3l + 2c = 12$$

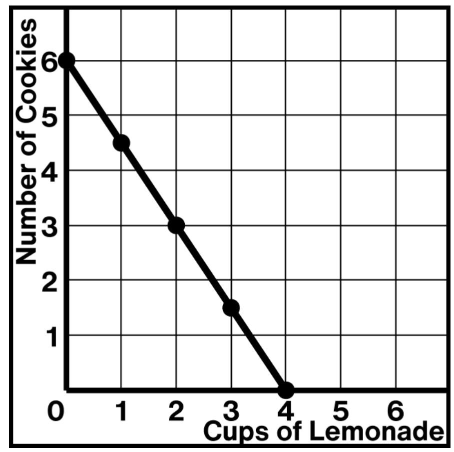
Equation Solved for c

$$c = 6 - \frac{3}{2}l$$

Table

l	0	2	4
c	6	3	0

Graph



Explain how **each** form of the equation is connected to the situation, table, or graph.
Responses vary.

The equation $3l + 2c = 12$ is connected to the **situation** because . . .

. . . you can see each part of the situation in the equation. For example, $3l$ is the money that the stand gets for selling l cups of lemonade for $\$3$ each.

The equation $c = 6 - \frac{3}{2}l$ is connected to the **table/graph** because . . .

. . . you can see the slope and vertical intercept in this equation. The graph includes the point $(0,\ 6)$ and the slope is $-\frac{3}{2}$.

Things I Want to Remember

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Unit A1.2, Linear Equations and Inequalities: Notes Name ____________________

Lessons 8–9: Rewriting Two-Variable Equations

Try This!

Here is an equation in standard form: $4x + 2y = 24$.

1. Solve $4x + 2y = 24$ for y .

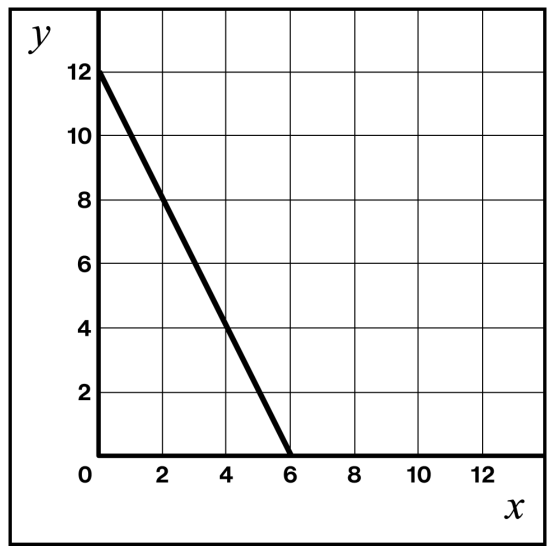
   $2y = 24 - 4x$

   $y = 12 - 2x$ **(or equivalent)**

2. Graph the equation $4x + 2y = 24$.

   Make a table if it helps with your thinking.

x	y
0	12
2	8
4	4



3. Write a situation that $4x + 2y = 24$ could represent.

   Write what x and y represent in your situation.

   Responses vary. **This situation could represent a snail trying to cross a gap that is 24 mm tall using 4 mm and 2 mm blocks. x represents the number of 4 mm blocks that are used and y represents the number of 2 mm blocks used.**

- ☐ I understand that the graph of a linear equation represents all the solutions to the equation.
- ☐ I can solve an equation for one of its variables and connect my new equation to its graph.
- ☐ I can make connections between equations, tables, descriptions, and graphs.
- ☐ I can write two linear equations to represent the same situation.

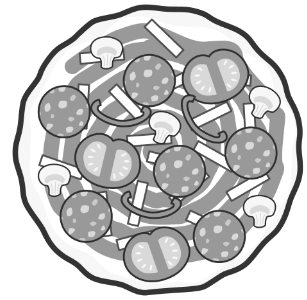
Lesson 10: Representing Situations With One-Variable Inequalities

Summary

Writing and solving inequalities can help us make sense of *constraints*.

Here is one example of a constraint:

- Tasia is planning a pizza party and can spend up to $\$140$. Each plain pizza costs $\$12$ and there is a delivery fee of $\$8$.



Write an inequality to represent the constraint in this situation.
Use p to represent the number of pizzas Tasia can buy with her budget.

$12p + 8 \leq 140$ **(or equivalent)**

What are 2–3 other constraints people might consider when planning a party?

Responses vary.

- **I can fit up to 35 people in the room I am using for the party.**
- **I need more than 50 cupcakes so everyone can choose their favorite flavor.**

Write inequalities to represent each constraint. ***Responses vary.***

$a \leq 35$ **where a represents the number of people at the party.**
$c > 50$ **where c represents the number of cupcakes purchased.**

Things I Want to Remember

Lesson 10: Representing Situations With One-Variable Inequalities

Try This!

Valeria wants to donate at least $\$120$ to her local food bank. She has already saved $\$64$ and is planning to save $\$8$ each week.

1. Why is Valeria's situation an example of a constraint? ***Responses vary.***

   Valeria's situation is an example of a constraint because there is a specific goal that she wants to meet or exceed.

2. Write an inequality to match Valeria's situation.

   Use w to represent the number of weeks Valeria will save $\$8$.

   $64 + 8w \geq 120$ **(or equivalent)**

3. Write some solutions to the inequality you wrote in problem 2. ***Responses vary.***

   Some possible values for w are $7,\ 18.5,$ and 100.

4. What are some other constraints that Valeria could have in her situation? ***Responses vary.***

   The food bank could ask for a minimum donation. Valeria could need to get her donation into the food bank by a specific deadline.

- [ ] I understand what a solution to an inequality is.
- [ ] I can interpret and write one-variable inequalities that represent constraints.

Lessons 11 and 12: Graphing and Solving One-Variable Inequalities

Summary

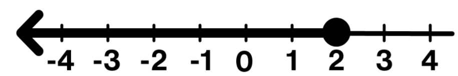
Solutions to one-variable inequalities can be represented on a number line.

List some solutions to $5x + 4 \geq 7x$.
Responses vary. $x = 2,\ x = -1,\ x = -3.7,\ x = -20$

Is $x = 2$ a solution to $5x + 4 \geq 7x$? **Yes.**
Explain how you know. ***Explanations vary.***

2 **is a solution because the graph has a closed circle at** $x = 2$ **and** $2 \geq 2$.

$$5x + 4 \geq 7x$$
$$4 \geq 2x$$
$$2 \geq x$$



Strategies for solving equations can help solve inequalities.

Let's solve the inequality $10 - 5x < 0$.

1. Show that the solution to its corresponding equation $10 - 5x = 0$ is $x = 2$.

   $10 - 5(2) = 0$

   $0 = 0$ ✓

2. Test values of x that are less than and greater than 2 in the inequality $10 - 5x < 0$.

   $x = 5$
   $10 - 5(5) < 0$
   $-15 < 0$ ✓

   $x = 0$
   $10 - 5(0) < 0$
   $10 < 0$ **False**.

3. What are the solutions to $10 - 5x < 0$?

   $x > 2$ **because** $x = 5$ **made the inequality true and** $5 > 2$**.**

Things I Want to Remember

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Unit A1.2, Linear Equations and Inequalities: Notes Name ______________________

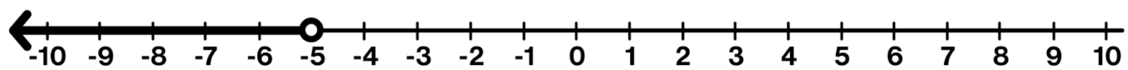
Lessons 11 and 12: Graphing and Solving One-Variable Inequalities

Try This!

1.1 Select **all** the values of x that are solutions to $-8x > 40$.

☐ $x = 10$ ☐ $x = 5$ ✓ $x = -10$ ☐ $x = -5$ ✓ $x = -6$

1.2 Graph all the solutions to $-8x > 40$ on the number line.



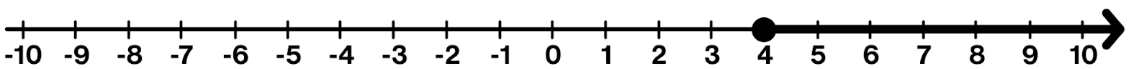
2.1 Solve $11 - 2x \le 3$. Use its corresponding equation if it helps with your thinking. ***Steps vary.***

$11 - 2x \le 3$

$-2x \le -8$

$x \ge 4$

2.2 Graph the solutions to $11 - 2x \le 3$ on the number line.



3. Here is Marco's work to solve and graph $3 - 2x > 3$.

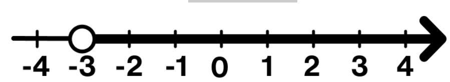
Explain the error Marco made in his work.

Responses vary. **Marco should test values less than and greater than -3. The values greater than -3 create false inequalities so the solutions are $x < -3$.**

$3 - 2x > 3$

$-2x > 6$

$x > -3$



☐ I can solve one-variable inequalities by reasoning.
☐ I can graph solutions to a one-variable inequality on the number line.
☐ I can solve a one-variable linear inequality using its corresponding equation.

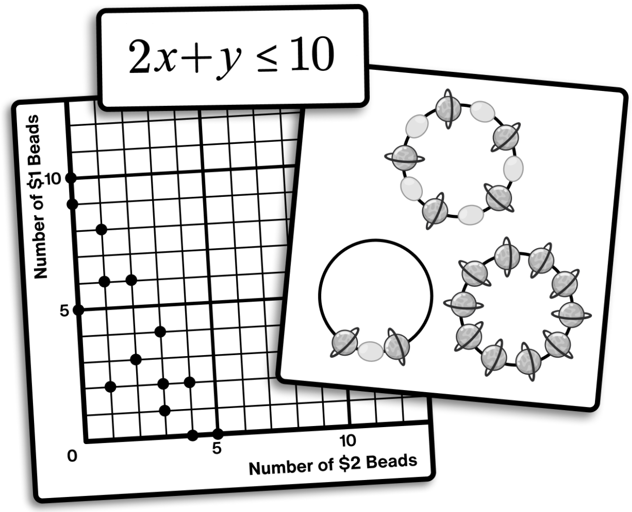
Lesson 13: Introduction to Two-Variable Inequalities

Summary

Graphs can help us visualize the solutions to two-variable inequalities.

Marco is making bracelets.
Planet beads cost $\$1$ and oval beads cost $\$2$.

Show or explain what each part of $2x + y \leq 10$ represents in Marco's situation.



- **2 represents the cost of each oval bead.**
- **x represents the number of oval beads Marco buys.**
- **y represents the number of planet beads.**
- **There is a secret 1 in front of the y, which represents how much a planet bead costs.**
- **10 represents how much money Marco has for buying beads for his bracelets.**

Choose a point shown on the graph. ***Points vary.*** $(2,\ 3)$

Show that this point is a solution to $2x + y \leq 10$.
Responses vary based on the point chosen.

$$2(2) + 3 \leq 10$$
$$4 + 3 \leq 10$$
$$7 \leq 10 \checkmark$$

Choose a point that is **not** shown that you think is also a solution. ***Points vary.*** $(1,\ 4)$

Show that this point is a solution to $2x + y \leq 10$.
Responses vary based on the point chosen.

$$2(1) + 4 \leq 10$$
$$2 + 4 \leq 10$$
$$6 \leq 10 \checkmark$$

Things I Want to Remember

Lesson 13: Introduction to Two-Variable Inequalities

Try This!

The Theater Club makes $5 for every student ticket they sell, x, and $7 for every adult ticket, y. They want to make at least $180 to buy costumes for their next show.

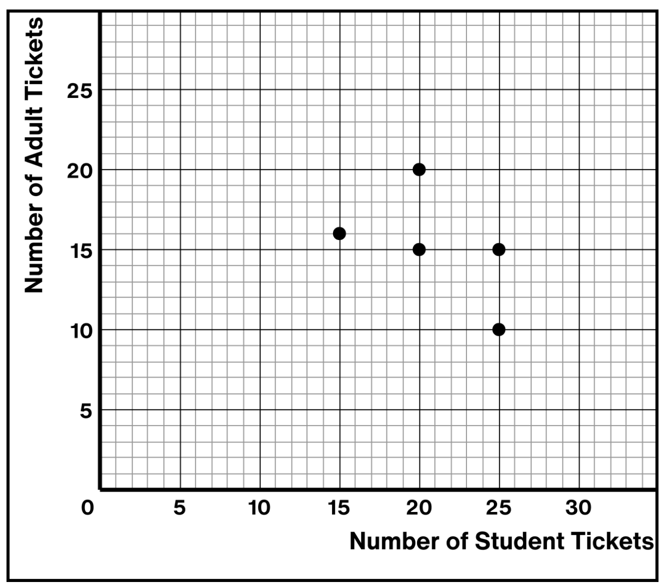
1.1 Explain how you know this situation is an example of a constraint.

***Responses vary.* This is an example of a constraint because the Theater Club has a minimum amount of money they want to make in order to buy costumes.**

1.2 Which inequality or equation represents this situation?

A. $5x + 7y \leq 180$ B. $5x + 7y = 180$ **C.** $5x + 7y \geq 180$ D. $7y = 5x + 180$

This graph shows some solutions to the Theater Club's situation.



2.1 Choose one solution: ***Points vary.***
$(20,\ 15)$

Explain what it means in the situation.

***Explanations vary.* If the theater club sells 20 student tickets and 15 adult tickets, they will reach their goal.**

2.2 Show that this point is a solution to the inequality you chose in problem 2.
Responses vary.

$$5(20) + 7(15) \geq 180$$
$$205 \geq 180 \checkmark$$

2.3 Choose another solution that is **not** shown on the graph. ***Points vary.*** $(30,\ 15)$
Show or explain how you know it is a solution.
***Explanations vary.* I know that $(25,\ 15)$ is a solution, so if they meet the goal selling only 25 student tickets, then they should also meet it if they sell 30 student tickets.**

- ☐ I can interpret what two-variable inequalities represent in a situation.
- ☐ I can show and explain what it means to be a solution to a two-variable inequality.

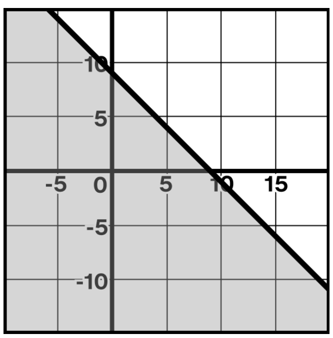
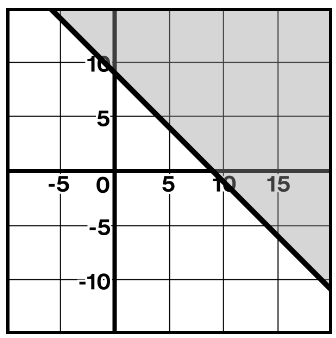
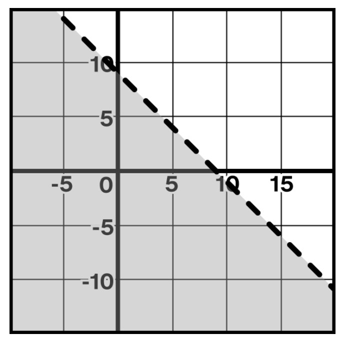
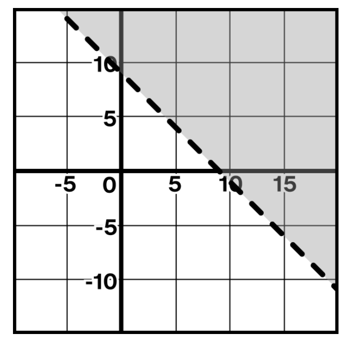
Lesson 14: Graphing Solutions to Two-Variable Inequalities

Summary

All the solutions to a two-variable linear inequality are represented on a graph as a half-plane.

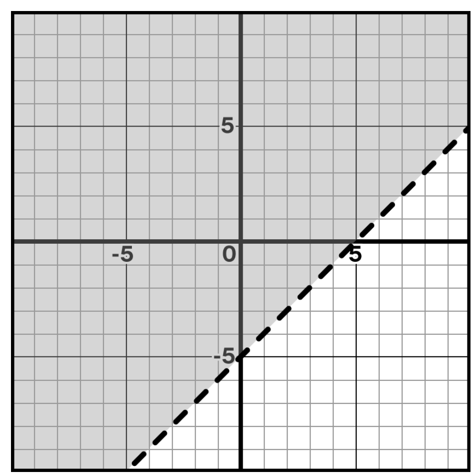
The graph on the left represents **all** the solutions to the inequality $x + y \leq 9$.

Write inequalities to match each of the remaining three graphs.

$x + y \leq 9$	$x + y \geq 9$	$x + y < 9$	$x + y > 9$
			

Juliana is graphing the solutions to $x - y < 5$.
Why is her line dashed? ***Responses vary.***

Juliana's line is dashed because the points on the boundary line *are not* included in the solution region.



Graph the solutions to $x - y < 5$.
Test points in the inequality to help with your thinking.

$(0, 0)$ $\quad$ $0 - 0 < 5$

$0 < 5$ ✓

$(7, 0)$ $\quad$ $7 - 0 < 5$

$7 < 5$ **False.**

Things I Want to Remember

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Unit A1.2, Linear Equations and Inequalities: Notes Name ______________________________

Lesson 14: Graphing Solutions to Two-Variable Inequalities

Try This!

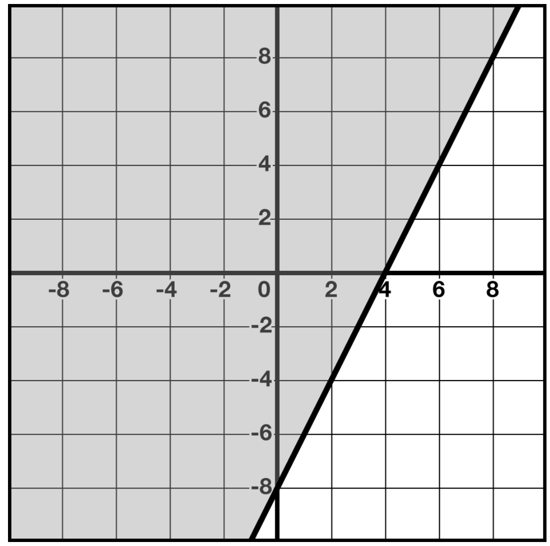
1. Which inequality does this graph represent?

   A. $2x - y > 8$ B. $2x - y \geq 8$

   C. $2x - y < 8$ **D.** $2x - y \leq 8$

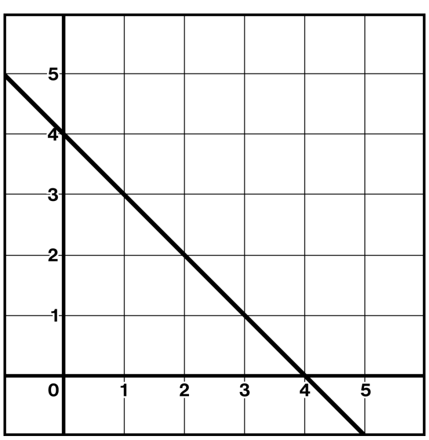
   Show or explain your thinking. ***Responses vary.***

   The solid line means the points on the boundary line are included in the solution, so the inequality symbol must be either $\leq$ or $\geq$. $(0, 0)$ is a solution. $2(0) - 0 = 0$ and since $0 \leq 8$, the inequality symbol should be $\leq$.

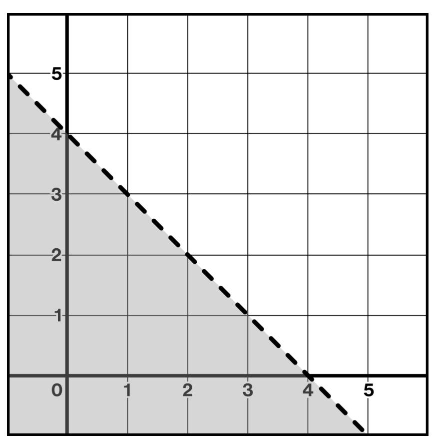


Here is a graph of $x + y = 4$. Graph the solutions to each of the following inequalities:

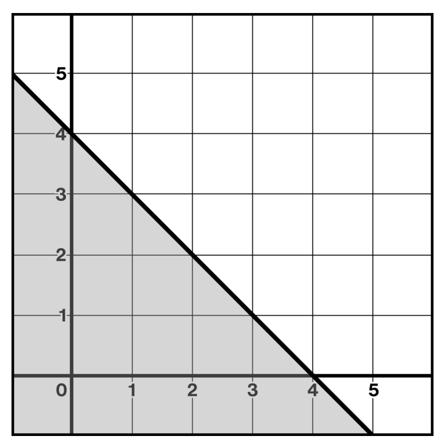
$x + y = 4$



2.1 $x + y < 4$



2.2 $x + y \leq 4$



- ☐ I understand how solutions to a two-variable linear inequality are represented on a graph.
- ☐ I can graph the solutions to a linear two-variable inequality given the graph of its corresponding line.

Lessons 15–16: Graphing Two-Variable Inequalities in Context

Summary

Solutions to two-variable inequalities on a graph can help us analyze situations and make decisions.

A group of students is installing a garden at their school. A vegetable bed will cost $\$15$ per square foot to install and a flower bed will cost $\$12$ per square foot. Their budget for the project is $\$300$.

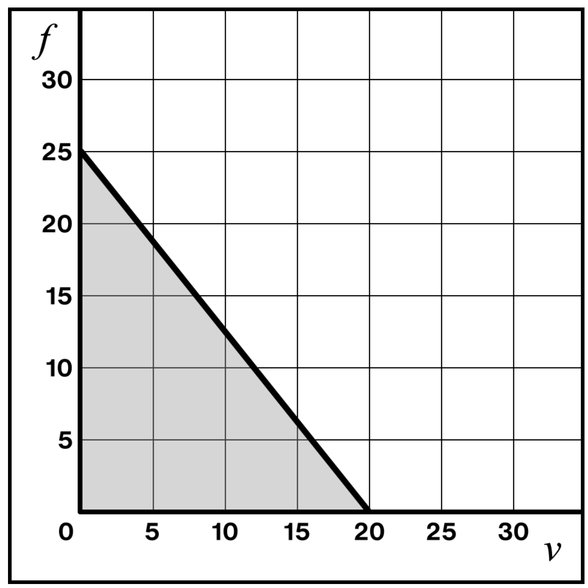
If $15v + 12f \leq 300$ represents the situation, define v and f.

v represents . . . **the number of square feet in the vegetable bed.**

f represents . . . **the number of square feet in the flower bed.**

Graph the equation $15v + 12f = 300$.
Use the table if it helps with your thinking.

v	f
0	25
10	12.5
20	0



Shade in the region that represents the solutions to the inequality $15v + 12f \leq 300$.

How many square feet of type of bed would you recommend the students plant? Why?

Responses vary. **I would recommend the students plant 15 square feet of vegetable beds and 6 square feet of flower beds because then they can use vegetables to feed the community.**

Things I Want to Remember

desmos

Unit A1.2, Linear Equations and Inequalities: Notes Name ______________________________

Lessons 15–16: Graphing Two-Variable Inequalities in Context

Try This!

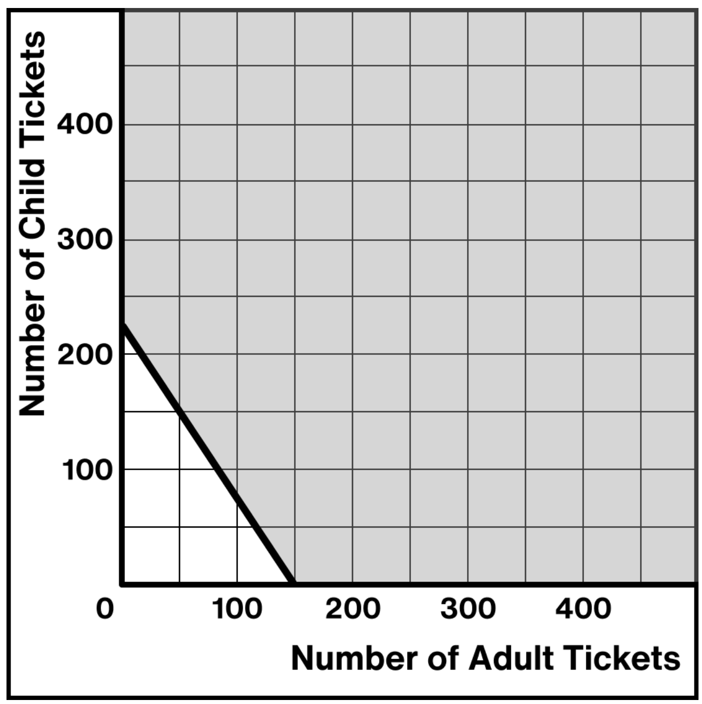
A theater needs to make at least $\$1\,800$ during each performance so that it can pay the actors and other workers. Each adult ticket costs $\$12$ and each child ticket costs $\$8$.

1. Write an inequality to represent this situation.
   - Use x to represent the number of adult tickets sold.
   - Use y to represent the number of child tickets sold.

   $12x + 8y \geq 1\,800$ **(or equivalent)**

2. Graph the solutions to your inequality.

   Use an equation or a table if it helps with your thinking.



3. Write a question that the theater could answer using the graph. ***Responses vary.***

   If the theater only sold adult tickets, how many tickets would they need to sell in order to reach their goal?

☐ I can graph the solutions to a two-variable linear inequality and interpret its solutions in context.
☐ I can use two-variable linear inequalities to analyze an issue in society.